CLAIMS:

1. A pixel sub-structure for a thick film dielectric electroluminescent display, said pixel sub-structure comprising:

at least two sub-pixels, each sub-pixel comprising a blue light emitting electroluminescent inorganic phosphor layer; and

at least one photoluminescent phosphor layer, each photoluminescent phosphor layer being associated with a respective one of said sub-pixels such that the blue light emitted by each respective one of said sub-pixels is substantially absorbed by the associated photoluminescent phosphor layer thereby causing said photoluminescent phosphor layer to emit a colored light other than the blue light.

2. A pixel sub-structure according to claim 1, wherein said sub-structure comprises two sub-pixels and one photoluminescent phosphor layer.

3. A pixel sub-structure according to claim 1, wherein said sub-structure comprises three sub-pixels and a first and a second photoluminescent phosphor layer, said first photoluminescent phosphor layer emits a colored light other than the blue light and said second photoluminescent phosphor layer emits a colored light other than the blue light and said colored light of said first photoluminescent phosphor layer.

4. A pixel sub-structure according to claim 1, wherein each sub-pixel further comprises a viewing side electrode associated with said blue emitting electroluminescent inorganic phosphor layer; and each photoluminescent phosphor layer is associated with said viewing side electrode of said respective one of said sub-pixels.

5. A pixel sub-structure according to claim 1, comprising a plurality of photoluminescent phosphor layers, each photoluminescent phosphor layer being associated with a different one of said sub-pixels.

6. A pixel sub-structure according to claim 1, further comprising at least one reflecting layer associated with said at least one photoluminescent phosphor layer.

7. A pixel sub-structure according to claim 4, wherein a reflecting layer is disposed over one or both surfaces of said photoluminescent phosphor layer.

8. A pixel sub-structure according to claim 1, further comprising at least one optical filter associated with said at least one photoluminescent phosphor layer such that said filter inhibits said at least one photoluminescent phosphor layer from substantially absorbing blue ambient light.

9. A pixel sub-structure according to claim 1, wherein an optical filter is disposed over the surface of said photoluminescent phosphor layer opposite to said viewing side electrode such that said filter inhibits said at least one photoluminescent phosphor layer from substantially absorbing blue ambient light.

10. A pixel sub-structure according to claim 1, comprising three sub-pixels.

11. A pixel sub-structure according to claim 1, wherein said blue light emitting electroluminescent inorganic phosphor is a blue emitting rare earth activated alkaline earth sulfide.

12. A pixel sub-structure according to claim 11, wherein said blue emitting rare earth activated alkaline earth sulfide is selected from the group consisting of rare earth activated alkaline earth thioaluminates, rare earth activated alkaline earth thiooxyaluminates, rare earth activated alkaline earth thiogallates, rare earth activated alkaline earth thiooxygallates, rare earth activated alkaline earth thioindates, rare earth activated alkaline earth thiooxyindates and mixtures thereof.

13. A pixel sub-structure according to claim 12, wherein said blue emitting rare earth activated alkaline earth sulfide is europium activated barium thioaluminate.

14. A pixel sub-structure according to claim 1, wherein said blue light emitting electroluminescent inorganic phosphor emits blue light having acceptable CIE coordinates with x less than about 0.2 and y less than about 0.15.

15. A pixel sub-structure according to claim 1, wherein said at least one photoluminescent phosphor layer is an insulating material with a band gap having an energy less than that of a photon of the blue light emitted.

16. A pixel sub-structure according to claim 1, wherein said photoluminescent phosphor layer comprises at least one dye, at least one dye in a matrix component, at least one photoluminescent powder, at least one photoluminescent powder in a matrix component, or mixtures thereof.

17. A pixel sub-structure according to claim 16, wherein said at least one dye is selected from the group consisting of red light emitting dyes, green light emitting dyes, and yellow light emitting dyes.

18. A pixel sub-structure according to claim 16, wherein said at least one photoluminescent powder is at least one inorganic photoluminescent powder.

19. A pixel sub-structure according to claim 18, wherein said at least one inorganic photoluminescent powder is selected from the group consisting of rare earth activated alkaline earth thioaluminates, rare earth activated alkaline earth thiogallates, rare earth activated alkaline earth thioindates, rare earth activated alkaline earth sulfides, yttrium aluminum garnet and rare earth activated alkaline earth silicates, rare earth activated alkaline earth

germanates, rare earth activated alkaline earth aluminates, and rare earth activated alkaline earth borates.

20. A pixel sub-structure according to claim 18, wherein said at least one inorganic photoluminescent powder is an inorganic semiconductor material.

21. A pixel sub-structure according to claim 20, wherein said inorganic semiconductor material is an inorganic semiconductor nanocrystalline material.

22. A pixel sub-structure according to claim 21, wherein said inorganic semiconductor nanocrystalline material is selected from the group consisting of semiconductor compounds CdS, CdSe, CdTe and mixtures thereof.

23. A pixel sub-structure according to claim 21, wherein said inorganic semiconductor nanocrystalline material comprises crystals in a size range of about 10 to about 200 Angstroms.

24. A pixel sub-structure according to claim 16, wherein said matrix component is selected from the group consisting of PMMA, epoxy and polymethylglutaridimide.

25. A pixel sub-structure according to claim 1, wherein at least one thin dielectric layer is on at least one surface of said blue light emitting electroluminescent inorganic phosphor layer.

26. A pixel sub-structure according to claim 1, further comprising a transparent cover plate, wherein said at least one photoluminescent phosphor layer is adhered thereto.

27. A pixel sub-structure according to claim 26, wherein said at least one photoluminescent phosphor layer is adhered to the outer surface of said

transparent cover plate and said at least one photoluminescent phosphor layer is coated with an optically transparent passivating layer.

28. A pixel sub-structure according to claim 4, wherein each photoluminescent phosphor layer is disposed on said viewing side electrode of said respective one of said sub-pixels.

29. A pixel sub-structure according claim 28, wherein each photoluminescent phosphor layer is disposed on an optically transparent barrier layer, said optically transparent barrier layer being disposed on said viewing side electrode.

30. A pixel sub-structure according to claim 1, wherein said photoluminescent phosphor layer is about 1 to about 10 microns in thickness.

31. A thick film dielectric electroluminescent display having pixels, each pixel comprising a thick dielectric layer associated with a pixel sub-structure, said pixel sub-structure comprising:

at least two sub-pixels, each sub-pixel emitting blue light; and

at least one photoluminescent phosphor layer, each photoluminescent phosphor layer being associated with a respective one of said sub-pixels such that the blue light emitted by each respective one of said sub-pixels is substantially absorbed by the associated photoluminescent phosphor layer thereby causing said photoluminescent phosphor layer to emit a colored light other than the blue light.

32. A thick film dielectric electroluminescent display according to claim 31, wherein said pixel sub-structure comprises two sub-pixels and one photoluminescent phosphor layer.

33. A thick film dielectric electroluminescent display according to claim 31, wherein said pixel sub-structure comprises three sub-pixels and a first and a

second photoluminescent phosphor layer, said first photoluminescent phosphor layer emits a colored light other than the blue light and said second photoluminescent phosphor layer emits a colored light other than the blue light and said colored light of said first photoluminescent phosphor layer.

34. A thick film dielectric electroluminescent display according to claim 31, wherein each sub-pixel comprises a blue light emitting electroluminescent phosphor layer and a viewing side electrode associated with said blue emitting electroluminescent phosphor layer; and each photoluminescent phosphor layer is associated with said viewing side electrode of said respective one of said sub-pixels.

35. A thick film dielectric electroluminescent display according to claim 31, comprising a plurality of photoluminescent phosphor layers, each photoluminescent phosphor layer being associated with a different one of said sub-pixels.

36. A thick film dielectric electroluminescent display according to claim 34, comprising a plurality of photoluminescent phosphor layers, each photoluminescent phosphor layer being associated with a different one of said viewing side electrodes.

37. A thick film dielectric electroluminescent display according to claim 31, wherein said sub-pixels comprise a blue light emitting electroluminescent phosphor layer.

38. A thick film dielectric electroluminescent display according to claim 37, wherein each of said sub-pixels comprise a viewing side electrode associated with said blue light emitting electroluminescent phosphor layer.

39. A thick film dielectric electroluminescent display according to claim 31, wherein each pixel comprises, in sequence:

a substrate;

a row electrode;

said thick dielectric layer; and

said pixel sub-structure.

40. A method of making a pixel sub-structure of claim 1 for a thick film dielectric electroluminescent display, said method comprising:

disposing each photoluminescent phosphor layer over a respective one of said sub-pixels such that the blue light emitted by each respective one of said sub-pixels is substantially absorbed by said associated photoluminescent phosphor layer thereby causing said photoluminescent phosphor layer to emit a colored light other than the blue light.

41. A method according to claim 40, wherein said pixel sub-structure comprises three sub-pixels and a first and a second photoluminescent phosphor layer, said disposing step comprising:

disposing said first photoluminescent phosphor layer over one of said sub-pixels such that the blue light emitted by that sub-pixel is substantially absorbed by said first photoluminescent phosphor layer thereby causing said first photoluminescent phosphor layer to emit a colored light other than the blue light; and

disposing said second photoluminescent phosphor layer over another one of said sub-pixels such that the blue light emitted by that sub-pixel is substantially absorbed by said second photoluminescent phosphor layer thereby causing said second photoluminescent phosphor layer to emit a colored light other than the blue light and said colored light of said first photoluminescent phosphor layer.

42. A method according to claim 40 further comprising:

disposing at least two viewing side electrodes over said blue emitting electroluminescent inorganic phosphor layer; and

disposing each photoluminescent phosphor layer over a respective one of said viewing side electrodes such that the blue light emitted by said electroluminescent phosphor layer is substantially absorbed by said associated photoluminescent phosphor layer thereby causing said photoluminescent phosphor layer to emit a colored light other than the blue light.

43. A method according to claim 42, wherein said pixel sub-structure comprises three sub-pixels, three viewing side electrodes, and a first and a second photoluminescent phosphor layer, said disposing step comprising:

disposing a first photoluminescent phosphor layer over one of said viewing side electrodes such that the blue light emitted by said electroluminescent phosphor layer is substantially absorbed by said first photoluminescent phosphor layer thereby causing said first photoluminescent phosphor layer to emit a colored light other than the blue light; and

disposing a second photoluminescent phosphor layer over an other one of said viewing side electrodes such that the blue light emitted by said electroluminescent phosphor layer is substantially absorbed by said second photoluminescent phosphor layer thereby causing said second photoluminescent phosphor layer to emit a colored light other than the blue light and said colored light of said first photoluminescent phosphor layer.

44. A method of making the pixel sub-structure according to claim 40, further comprising disposing a transparent cover plate over said sub-pixels and adhering said photoluminescent phosphor layer thereto.

45. A method of making the pixel sub-structure according to claim 42, further comprising disposing a transparent cover plate over said viewing side electrodes and adhering said photoluminescent phosphor layer thereto.

46. A method of making the pixel sub-structure according to claim 40, further comprising coating said photoluminescent phosphor with an optically transparent passivating layer.

47. A method of making the pixel sub-structure according to claim 42, further comprising coating said photoluminescent phosphor with an optically transparent passivating layer.

48. A method of making the pixel sub-structure according to claim 40, further comprising disposing at least one reflecting layer on at least one surface of said photoluminescent phosphor layer.

49. A method of making the pixel sub-structure according to claim 40, further comprising disposing at least one optical filter over said photoluminescent phosphor layer such that said filter inhibits said photoluminescent phosphor layer from substantially absorbing blue ambient light.

50. A pixel sub-structure according to claim 1, further comprising a thin optically transparent sheet disposed over said sub-pixels, said at least one photoluminescent phosphor layer being adhered to one side of said optically transparent sheet opposite to said sub-pixels, a transparent cover plate being disposed over the optically transparent sheet such that an air gap is formed between the optically transparent sheet and the transparent cover plate, with said at least one photoluminescent phosphor layer therebetween.

51. A pixel sub-structure according to claim 4, further comprising a thin optically transparent sheet disposed over said viewing side electrodes, said at least one photoluminescent phosphor layer being adhered to one side of said optically transparent sheet opposite to said viewing side electrodes, a transparent cover plate being disposed over the optically transparent sheet such that an air gap is formed between the optically transparent sheet and the

transparent cover plate, with said at least one photoluminescent phosphor layer therebetween.

52. A pixel sub-structure according to claim 1, further comprising at least one other photoluminescent phosphor layer associated with at least one of each said photoluminescent phosphor layer associated with the respective one of said sub-pixels.

53. A pixel sub-structure according to claim 4, further comprising at least one other photoluminescent phosphor layer associated with at least one of each said photoluminescent phosphor layer associated with the respective one of said viewing side electrodes.

54. A photoluminescent phosphor material for emissive displays, said material comprising:

a pigment powder comprising a solid solution of organic photoluminescent molecules; and

a matrix material, wherein said pigment powder is dispersed in said matrix material, said matrix material being chemically and physically compatible with said pigment powder such that the photoluminescent efficiency of the organic photoluminescent molecules are substantially maintained.

55. A photoluminescent phosphor material according to claim 54, wherein said pigment powder is selected from the group consisting of a green pigment Radiant™ MC-CH5860, a green pigment Radiant™ MP-CH5510, a blue pigment Radiant™ MP-BL5529, a red pigment Radiant™ MC-RD5515, a red pigment Radiant™ MC-OR5864, and a yellow pigment Radiant™ MC-OY5862, and mixtures thereof.

56. A photoluminescent phosphor material according to claim 54, wherein said matrix material is selected from the group consisting of an epoxy, polymethylmethacrylate (PMMA) and polymethylglutaridimide.

57. A photoluminescent phosphor material according to claim 56, wherein said matrix material is UV-imagable resin Luxul™-1010 (80-B).

58. A photoluminescent phosphor material according to claim 54, wherein said matrix material is a photoresist material.

59. A pixel sub-structure according to claim 1, wherein said photoluminescent phosphor layer is a photoluminescent phosphor material according to any one of claims 54 to 58.

60. A method for making said photoluminescent phosphor material according to claim 54, said method comprising mixing said pigment powder and said matrix material to provide a uniform dispersion of said pigment powder in said matrix material.

61. A method according to claim 60, wherein the uniform dispersion may be printed or spread on a substrate to form a photoluminescent phosphor layer.

62. A photoluminescent phosphor material according to claim 54 in an emissive display.

63. A photoluminescent phosphor material according to claim 62, wherein said emissive display is selected from the group consisting of a thick film electroluminescent display, an organic light emitting diode display, a liquid crystal display and a plasma display.